

JC10 Rec'd PCT/PTO 15 JUN 2005

10/510043

PTO-1390 (Rev. 12-2004)

Approved for use through 3/31/2007. OMB 0651-0021

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE


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<b>TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A SUBMISSION UNDER 35 U.S.C. 371</b>		<b>ATTORNEY'S DOCKET NUMBER</b> 1304.P004US/LYH/jc
		<b>U.S. APPLICATION NO. (If known, see 37 CFR 1.5)</b> 10/510,043
<b>INTERNATIONAL APPLICATION NO.</b> PCT/SG2003/000063	<b>INTERNATIONAL FILING DATE</b> March 28, 2003	<b>PRIORITY DATE CLAIMED</b> April 3, 2002
<b>TITLE OF INVENTION</b> FIBER OPTIC BIO-SENSOR		
<b>APPLICANT(S) FOR DO/EO/US</b> KISHEN Anil, MECHERY Shelly John, LIM Chu-Sing, ASUNDI Anand Krishna		
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:		
<p>1. <input type="checkbox"/> This is a <b>FIRST</b> submission of items concerning a submission under 35 U.S.C. 371.</p> <p>2. <input checked="" type="checkbox"/> This is a <b>SECOND</b> or <b>SUBSEQUENT</b> submission of items concerning a submission under 35 U.S.C. 371.</p> <p>3. <input type="checkbox"/> This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.</p> <p>4. <input type="checkbox"/> The US has been elected (Article 31).</p> <p>5. <input type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2))</p> <p style="margin-left: 20px;">a. <input type="checkbox"/> is attached hereto (required only if not communicated by the International Bureau).</p> <p style="margin-left: 20px;">b. <input type="checkbox"/> has been communicated by the International Bureau.</p> <p style="margin-left: 20px;">c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US).</p> <p>6. <input type="checkbox"/> An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).</p> <p style="margin-left: 20px;">a. <input type="checkbox"/> is attached hereto.</p> <p style="margin-left: 20px;">b. <input type="checkbox"/> has been previously submitted under 35 U.S.C. 154(d)(4).</p> <p>7. <input type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))</p> <p style="margin-left: 20px;">a. <input type="checkbox"/> are attached hereto (required only if not communicated by the International Bureau).</p> <p style="margin-left: 20px;">b. <input type="checkbox"/> have been communicated by the International Bureau.</p> <p style="margin-left: 20px;">c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired.</p> <p style="margin-left: 20px;">d. <input type="checkbox"/> have not been made and will not be made.</p> <p>8. <input type="checkbox"/> An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).</p> <p>9. <input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).</p> <p>10. <input type="checkbox"/> An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).</p> <p>Items 11 to 20 below concern document(s) or information included:</p> <p>11. <input type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98.</p> <p>12. <input checked="" type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.</p> <p>13. <input type="checkbox"/> A preliminary amendment.</p> <p>14. <input type="checkbox"/> An Application Data Sheet under 37 CFR 1.76.</p> <p>15. <input type="checkbox"/> A substitute specification.</p> <p>16. <input type="checkbox"/> A power of attorney and/or change of address letter.</p> <p>17. <input type="checkbox"/> A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 37 CFR 1.821- 1.825.</p> <p>18. <input type="checkbox"/> A second copy of the published International Application under 35 U.S.C. 154(d)(4).</p> <p>19. <input type="checkbox"/> A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).</p> <p>20. <input type="checkbox"/> Other items or information:</p>		

This collection of information is required by 37 CFR 1.414 and 1.491-1.492. The information is required to obtain or retain a benefit by the public, which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 15 minutes to complete, including gathering information, preparing, and submitting the completed form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop PCT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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U.S. APPLICATION NO. (if known, see 37 CFR 1.5)		INTERNATIONAL APPLICATION NO.		ATTORNEY'S DOCKET NUMBER	
10/510,043		PCT/SG2003/000063		1304.P004US/LYH/jc	
21. The following fees are submitted:				Applicant use	Office use only
<input type="checkbox"/> a) Basic national fee..... \$300.00				\$	
<input type="checkbox"/> b) Examination fee..... \$200.00				\$	
<input type="checkbox"/> c) Search fee..... \$500.00				\$	
TOTAL OF ABOVE CALCULATIONS = \$1000.00				\$	
<input type="checkbox"/> Additional fee for specification and drawings filed in paper over 100 sheets (excluding sequence listing or computer program listing filed in an electronic medium). The fee is \$250 for each additional 50 sheets of paper or fraction thereof.					
Total Sheets	Extra sheets	Number of each additional 50 or fraction thereof (round up to a whole number)	RATE		
- 100 =	/50 =	0	x \$250.00	\$ 0.00	
Surcharge of \$130.00 for furnishing the oath or declaration later than 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				\$ 130.00	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	\$	
Total claims	24 - 20 =	4	x \$50.00	\$ 200.00	
Independent claims	4 - 3 =	1	x \$200.00	\$ 200.00	
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ \$360.00	\$ 0.00	
TOTAL OF ABOVE CALCULATIONS =				\$ 530.00	
<input checked="" type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.				\$ 265.00	
SUBTOTAL =				\$ 265.00	
Processing fee of \$130.00 for furnishing the English translation later than 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				\$	
TOTAL NATIONAL FEE =				\$ 265.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property				\$ 40.00	
TOTAL FEES ENCLOSED =				\$ 305.00	
Amount to be refunded:					\$
Amount to be charged					\$
<p>a. <input type="checkbox"/> A check in the amount of \$ _____ to cover the above fees is enclosed.</p> <p>b. <input type="checkbox"/> Please charge my Deposit Account No. _____ in the amount of \$ _____ to cover the above fees. A duplicate copy of this sheet is enclosed.</p> <p>c. <input type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. _____. A duplicate copy of this sheet is enclosed.</p> <p>d. <input checked="" type="checkbox"/> Fees are to be charged to a credit card. <b>WARNING:</b> Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.</p>					
<p><b>NOTE:</b> Where an appropriate time limit under 37 CFR 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the International Application to pending status.</p> <p>SEND ALL CORRESPONDENCE TO:</p>					
Customer Number: 38556			<p></p> <p>SIGNATURE</p> <p>George D. Liu</p> <p>NAME</p> <p>47,752</p> <p>REGISTRATION NUMBER</p>		

10/510043

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.: 10/510/043  
 First-Named Inventor: KISHEN Anil  
 International Filing Date: March 28, 2003  
 International Application No: PCT/SG03/00063  
 Title: FIBER OPTIC BIO-SENSOR  
 Confirmation No.: 8341

Attorney Docket No.:  
 1304.P004US/LYH/jc  
 Customer No.: 38556

**RESPONSE TO NOTIFICATION OF MISSING REQUIREMENTS UNDER 35 U.S.C. 371**

United States Patent and Trademark Office  
 Mail Stop Missing Parts  
 Commissioner for Patents  
 P.O. Box 1450  
 Alexandria, VA 22313-1450  
 USA

**Attn: Mr Darrell C Cottman**

Dear Mr Cottman:

We refer to your Notice to File Missing Requirements under 35 U.S.C. 371 dated April 28, 2005.

Please be advised that the Total Additional Fees required for this application should be \$200 for a Small Entity and not \$440. The discrepancy lies in the Total No of Claims. It should be \$100 for 4 Total Claims over 20 instead of \$225 for 9 Total Claims over 20.

The following documents are enclosed for your easy reference:

1. "Annex A" (extracted from PCT Specifications): consists of pages 25 to 28 with a total of 19 claims, and
2. "Annex B" (extracted from IPER Annexes): consists of amended sheets of Page 29 and 30 with additional 5 claims (claims 20 to 24). Out of these new claims, there were 1 Independent Claim and 1 Multiple Claim.

Based on Annexes A and B, the Total No of Claims should be 24. As a result of the added claims in "Annex B", the additional fees should be as follows:

- \$100 for 1 Independent Claim over 3
- \$100 for 4 Total Claims over 20
- \$0 for Multiple Dependent Claim surcharge

Since the Multiple Claim was already paid previously, there should be no additional fee for additional Multiple Claim. A copy of your Notice with mark-up charges is enclosed for your easy reference.

Cont'd ....2/-

In response to the missing requirements, based on our explanations and calculation above, we are pleased to enclose the following documents:

1. Transmittal Form (PTO-1390),
2. Recordation Form (PTO-1595) and a copy of the Assignment of Invention,
3. Credit Card Payment of \$305 (additional fees plus late Oath or Declaration charges and Recordation of Assignment)

We hope this is now in order for the issuance of Official Filing Receipt.

Thank you.

Yours sincerely,  
**Lawrence Y.D. Ho & Associates**



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**George D. Liu**  
Registration No. 47,752

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**June 14, 2005**

*Date*

Encl.

Correspondence Address

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Tel: (703) 536-1713

Fax: (703) 415-8601



UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office  
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U.S. APPLICATION NUMBER NO. 10/510,043	FIRST NAMED APPLICANT George D. Liu	ATTY. DOCKET NO.
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George D. Liu  
Lawrence Y D Ho & Associates  
2101 Crystal Plaza Arc  
PMB 400  
Arlington, VA 22202

INTERNATIONAL APPLICATION NO. PCT/SG03/00063	
I.A. FILING DATE 03/28/2003	PRIORITY DATE 04/03/2002

CONFIRMATION NO. 8341  
371 FORMALITIES LETTER



Date Mailed: 04/28/2005

**NOTIFICATION OF MISSING REQUIREMENTS UNDER 35 U.S.C. 371 IN THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US)**

The following items have been submitted by the applicant or the IB to the United States Patent and Trademark Office as a Designated / Elected Office (37 CFR 1.495).

- Indication of Small Entity Status
- Copy of the International Application filed on 10/01/2004
- Copy of the International Search Report filed on 10/01/2004
- Copy of IPE Report filed on 10/01/2004
- Copy of Annexes to the IPER filed on 10/01/2004
- Small Entity Statement filed on 10/01/2004
- Request for Immediate Examination filed on 10/01/2004
- U.S. Basic National Fees filed on 10/01/2004
- Priority Documents filed on 10/01/2004

15 JUN 2005  
BY: [Signature]

The applicant needs to satisfy supplemental fees problems indicated below.

The following items **MUST** be furnished within the period set forth below in order to complete the requirements for acceptance under 35 U.S.C. 371:

- Additional claim fees of \$505 as a small entity, including any required multiple dependent claim fee, are required. Applicant must submit the additional claim fees or cancel the additional claims for which fees are due.
- Oath or declaration of the inventors, in compliance with 37 CFR 1.497(a) and (b), identifying the application by the International application number and international filing date.
- \$65 Surcharge for providing the oath or declaration later than 30 months from the priority date (37 CFR 1.492(e)) is required.

SUMMARY OF FEES DUE:

\$265

Total additional fees required for this application is \$440 for a Small Entity:

- \$65 Late oath or declaration Surcharge.

\$200

- Total additional claim fee(s) for this application is \$505

- \$100 for 1 independent claims over 3.

- \$225 for total claims over 20.

- \$180 for multiple dependent claim surcharge.

0

(A previous payment of \$130 will be applied to the additional fees indicated above.)

**ALL OF THE ITEMS SET FORTH ABOVE MUST BE SUBMITTED WITHIN TWO (2) MONTHS FROM THE DATE OF THIS NOTICE OR BY 32 MONTHS FROM THE PRIORITY DATE FOR THE APPLICATION, WHICHEVER IS LATER. FAILURE TO PROPERLY RESPOND WILL RESULT IN ABANDONMENT.**

The time period set above may be extended by filing a petition and fee for extension of time under the provisions of 37 CFR 1.136(a).

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

*A copy of this notice **MUST** be returned with the response.*

DARRELL C COTTMAN

Telephone: (703) 308-9140 EXT 203

PART 1 - ATTORNEY/APPLICANT COPY

U.S. APPLICATION NUMBER NO.	INTERNATIONAL APPLICATION NO.	ATTY. DOCKET NO.
10/510,043	PCT/SG03/00063	

## THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A sensor for sensing and/or monitoring at least one property associated with transformation of a biochemical analyte by at least one microorganism, said sensor comprising:
  - at least one fibre optic member having at least one unclad portion;
  - a coating applied to the at least one unclad portion;
  - a precursor associated with the coating, said precursor transformable by the at least one microorganism;
  - wherein
  - transformation of the precursor produces a spectroscopically detectable indicator of the at least one property.
2. The sensor of claim 1 wherein the unclad portion of the fibre optic member is a declad portion.
3. The sensor of claim 1 comprising a plurality of unclad portions.
4. The sensor of claim 3 further comprising two or more separate fibre optic members.
5. The sensor of claim 1 further adapted to cooperate with analysis means for determining the presence of the spectroscopically detectable indicator.
- ✓ 6. The sensor of any one of the proceeding claims wherein the coating is a glass film. (5)
- ✓ 7. The sensor of the proceeding claim wherein the glass film is both porous and thin. (1)
- ✓ 8. The sensor of any one of the proceeding claims wherein the precursor is immobilised within the coating. (1)

- ✓ 9. The sensor of the proceeding claim wherein the precursor comprises one or more of D-mannitol, carbol fuchsine, methylene blue, sucrose or other suitable compound. (1)
10. The sensor of claim 1 wherein transformation of the precursor results in a product which cooperates with an adjunctive compound to produce the spectroscopically detectable indicator.
11. A sensor system for sensing at least one property associated with transformation of a precursor by one or more microorganisms, said sensor system comprising:
- a fibre optic member having at least one unclad portion of optic fibre;
  - a coating applied to the at least one unclad portion;
  - a precursor associated with the coating, said precursor transformable by at the one or more microorganisms;
  - a light source adapted to cooperate with a first end of the fibre optic member to provide input light to the fibre optic member; and
  - monitoring means adapted to cooperate with the unclad portion to detect an indicator signal in received light from the fibre optic member, said indicator signal indicative of the at least one property;
- wherein
- transformation of the precursor by the one or more microorganisms produces the indicator signal by interaction with the input light to produce the received light.
12. The sensor system of claim 12 wherein interaction with the light is interactive with an evanescent wave form of the input light.
13. A method of producing a sensor, said method comprising the steps of:
- decladding one or more sections of a core of a fibre optic member;
  - applying a coating to the one or more sections, said coating immobilising a



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precursor to a spectroscopically detectable indicator, the precursor transformable to the detectable indicator by the activity of one or more microorganisms.

- ✓ 14. A method of identifying the presence of at least one type of microorganism comprising the steps of:
- activating a light source in cooperating relationship to a first end of a sensor according to any one of claims 1 to 11;
  - monitoring the electromagnetic output from a coated unclad section;
  - locating the sensor with its coated unclad section in contact with the sample; and
  - analysing the electromagnetic output to determine the presence of the at least one type of microorganism. (i)
- ✓ 15. The method of claim 14 wherein monitoring the electromagnetic output comprises spectroscopically monitoring the electromagnetic output. (i)
- ✓ 16. The method of either one of claim 14 or claim 15 wherein analysing the electromagnetic output comprises conducting absorption analysis to identify wave lengths of peak absorption of electromagnetic output. (i)
- ✓ 17. The method of claim 16 wherein analysis of the electromagnetic output includes operating a programmable device programmed to receive digital information from a spectroscope and provide an analysis of results. (i)
- ✓ 18. The method of claim 17 wherein the programmable device is programmed to identify one or more features of the at least one microorganism, the one or more features being selected from a group including genus of microorganism, species of microorganism, variety of microorganism, concentration of microorganism and speed of development of indicator. (i)
- ✓ 19. The method of claim 18 wherein the programmable device is further programmed to ascribe an index value to each identified feature and provide an

(1)

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overall index for a sample according to the algorithm

$$C_s = \sum lv$$

where:

C = an overall index

lv = individual indices.

Added claims

20. A method of coating a sensor for sensing and/or monitoring at least one property associated with transformation of a biochemical analyte by at least one microorganism, comprising steps of:

making a coating mixture by dispersing a precursor in a sol-gel solution; wherein the precursor is transformable by the at least one microorganism; and

coating the sensor with the coating mixture; wherein the sensor comprises at least one fiber optic member having at least one unclad portion, and the coating is preferably applied to the unclad portion.

21. The method of coating a sensor of claim 20, wherein the sol-gel solution is made by hydrolysis of Tetra Ethyl Ortho Silica; wherein the molecule used for hydrolysis is selected from the group consisting of H<sub>2</sub>O, anhydrous ethanol, and hydrochloric acid.

✓ 22. The method of coating a sensor of any of claims 20-21, wherein the sol-gel coating is done by dip coating. 2

✓ 23. The method of coating a sensor of any of claims 20-22, wherein the precursor is selected from the group consisting of D-mannitol, carbol fuchsine, methylene blue, and sucrose. (d)

10/510043

"Annex B"

PCT/SG03/00063

Received 18 December 2003

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- ✓ 24. The method of coating a sensor of any of claims 20-23, wherein the resultant product from the transformable precursor cooperates with an adjunctive compound to produce the spectroscopically detectable indicator. (1)

AMENDED SHEET  
IPE/AU



UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office  
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www.uspto.gov

U.S. APPLICATION NUMBER NO. 10/510,043	FIRST NAMED APPLICANT George D. Liu	ATTY. DOCKET NO.
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INTERNATIONAL APPLICATION NO. PCT/SG03/00063	
I.A. FILING DATE 03/28/2003	PRIORITY DATE 04/03/2002

38556  
LAWRENCE Y.D. HO & ASSOCIATES PTE LTD  
30 BIDEFORD ROAD, #07-01, THONGSIA BUILDING  
SINGAPORE, 229922  
SINGAPORE

CONFIRMATION NO. 8341  
371 FORMALITIES LETTER



Date Mailed: 10/31/2005

NOTIFICATION OF DEFECTIVE RESPONSE

The following items have been submitted by the applicant or the IB to the United States Patent and Trademark Office as an Elected Office (37 CFR 1.495):

- Indication of Small Entity Status
- Priority Document
- Copy of the International Application filed on 10/01/2004
- Copy of the International Search Report filed on 10/01/2004
- Copy of IPE Report filed on 10/01/2004
- Copy of Annexes to the IPER filed on 10/01/2004
- Oath or Declaration filed on 06/15/2005
- Small Entity Statement filed on 10/01/2004
- Request for Immediate Examination filed on 10/01/2004
- U.S. Basic National Fees filed on 10/01/2004
- Assignment filed on 06/15/2005
- Priority Documents filed on 10/01/2004

Applicant's response filed 06/15/2005 is hereby acknowledged. The following requirements set forth in the NOTIFICATION of MISSING REQUIREMENTS mailed 04/28/2005 have not been completed.

The applicant needs to satisfy supplemental fees problems indicated below.

The following items **MUST** be furnished within the period set forth below in order to complete the requirements for acceptance under 35 U.S.C. 371:

- Additional claim fees of \$505 as a small entity, including any required multiple dependent claim fee, are required. Applicant must submit the additional claim fees or cancel the additional claims for which fees are due.
- Surcharge (for late submission of filing fee, search fee, examination fee or oath or declaration) as set forth in 37 CFR 1.492(h) of \$65 was not received.

SUMMARY OF FEES DUE:

Total additional fees required for this application is **\$440** for a Small Entity:

- **\$65** Surcharge.

**Applicant is required to complete the response within a time limit of ONE MONTH from the date of this Notification or within the time remaining in the response set forth in the Notification of Missing Requirements, whichever is the longer. No extension of this time limit may be granted under 37 CFR 1.136, but the period for response set in the Notification of Missing Requirements may be extended under 37 CFR 1.136(a).**

- Total additional claim fee(s) for this application is **\$ 505**
  - **\$100** for **1** independent claims over 3.
  - **\$225** for **9** total claims over 20.
  - **\$180** for multiple dependent claim surcharge.

(A previous payment of **\$130** will be applied to the additional fees indicated above.)

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

*A copy of this notice **MUST** be returned with the response.*

DARRELL C COTTMAN

Telephone: (703) 308-9140 EXT 203

PART 2 - OFFICE COPY

U.S. APPLICATION NUMBER NO.	INTERNATIONAL APPLICATION NO.	ATTY. DOCKET NO.
10/510,043	PCT/SG03/00063	

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